Submitter Name: Bethany Sump
Submitter Email: bethanysump2022@u.northwestern.edu
PI Name: Jason Brickner
PI Email: j-brickner@northwestern.edu

Molecular Mechanisms for Epigenetic Transcriptional Poised Memory State

Bethany Sump[1], Jason Brickner[1]

[1]Molecular Biosciences, Northwestern University

The major mechanism by which cells react to changes in their environment is by altering transcription. In some cases, the rate and mechanism of transcriptional regulation is affected by prior experiences of the cell. This conserved phenomenon is known as *epigenetic transcriptional memory*; for several generations following certain stimuli, certain genes show a more rapid induction upon a subsequent challenge. The genes that show memory exhibit changes in chromatin structure and recruitment of 'poised' RNA Polymerase II preinitiation complex (RNAPII PIC) at the promoter. Using the epigenetic memory of inositol starvation in budding yeast as a model, we find that memory requires interaction with the nuclear pore complex directed by a memory-specific transcription factor and memory-specific chromatin modifications. Loss of these chromatin marks or the interaction with the NPC disrupts memory. These chromatin changes function upstream of RNAPII and allow $Cdk8^{+}$ Mediator-dependent PIC recruitment. Poising enhances the rate of reactivation, leading to a strong fitness advantage. I will present current work dissecting the mechanistic contributions of these factors to establishment, maintenance and epigenetic inheritance of memory.